

REMARKS

Claims 17 and 20-44 remain in this application. No claims have been amended, cancelled, or added. The Applicants respectfully request reconsideration of this application in view of the above amendments and the following remarks.

35 U.S.C. §103 Rejection – Usami in view Havemann and Doo

The Examiner has rejected claims 17, 24-30 and 35-37 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,222,269 to Usami (hereinafter referred to as “Usami”) in view of U.S. Patent No. 5,751,066 to Havemann (hereinafter “Havemann”) and U.S. Patent No. 4,153,988 to Doo (hereinafter “Doo”).

Claim 17 recites at least, *“patterning the mask layer such that the first and second power interconnect lines and a first portion of the patterned first layer are covered, and the third and fourth signal interconnect lines and a second portion of the patterned first layer are uncovered”,* and *“depositing a second layer of a second dielectric material between the third and fourth signal interconnect lines, the second dielectric material having a smaller dielectric constant than the first dielectric material”.*

Usami and Havemann do not teach or suggest: (1) power lines, (2) patterning such that power lines are covered and signal lines are uncovered, nor (3) depositing a smaller dielectric constant material between signal lines than between power lines.

In the present rejection the Examiner admitted that Usami lacks specifying that the plurality of interconnect lines include power interconnect lines (first and second) and signal interconnect lines (third and fourth). The Applicants respectfully agree. There is no mention whatsoever of power lines in Usami. Furthermore, there is no mention of power lines in Havemann. There is also no mention of power driver noise or other problems associated with power lines in either

reference. This being the case, it is not surprising that there is also no teaching or suggestion of patterning such that power lines are covered and signal lines are uncovered, nor of depositing a smaller dielectric constant material between signal lines than between power lines. Accordingly, Usami and Havemann clearly do not teach or suggest the limitations of claim 17. Additionally, the Applicants respectfully submit that the complete lack of a discussion of power lines and driver noise makes it unlikely that a person of ordinary skill in the art would find the discussion in Usami relevant to power lines or to reducing power driver noise.

The Examiner has modified Usami in order to reject claim 17. The Examiner has stated that the problems associated with power lines (i.e., driver noise), the reduction of driver noise by increasing the capacitance of the power line, and the formula for capacitance were well known in the art. The Examiner has also stated that it would have been obvious to one of ordinary level of skill in the art to modify Usami by utilizing the interconnect line "3" for a combination of power lines and signal lines on the same level of metallization because the two dielectric materials ("4" and "5") can be readily utilized to increase capacitance between power lines and to decrease parasitic capacitance between signal lines.

The Applicants respectfully submit that the modification of Usami is inappropriate for at least the reasons that: (a) the conclusion of obviousness is clearly based on hindsight reasoning; and (b) it is not appropriate to use the interconnect line "3" for a combination of power lines and signal lines.

First, the Examiner's conclusion of obviousness is clearly based on hindsight reasoning. In order for the modification proposed by the Examiner to be appropriate, there must be some teaching, suggestion, or motivation of the desirability of the modification of Usami found either in the cited art references themselves or in the knowledge generally available to one of ordinary skill in the art. Such teaching, suggestion, or motivation does not exist. The Examiner has not established a prior art teaching, suggestion, or motivation that it would be desirable to use a first

dielectric material between a plurality of power lines and a second dielectric material between a plurality of signal lines. Accordingly, the Applicants respectfully submit that the rejection is based on inappropriate hindsight reasoning.

Second, it is not appropriate to use the interconnect line "3" for a combination of power lines and signal lines, as proposed by the Examiner in order to reject claim 17. Using the interconnect lines "3" for both power lines and signal lines is inconsistent with the discussion in Usami. While it is true that Usami does not specify that the interconnect lines may include power lines, the discussion in Usami clearly limits the interconnect lines to signal lines. Usami repeatedly discusses that a low dielectric constant insulator be used in a narrowly-spaced region between adjacent interconnect lines and that a higher dielectric constant insulator be used in a widely-spaced region between adjacent interconnect lines. This teaching clearly limits Usami to signal lines. Using a low dielectric constant insulator in a region between narrowly-spaced power lines would exacerbate driver noise problems. Accordingly, although it is not expressly stated in Usami that the interconnect lines are limited to signal lines, the discussion in Usami makes it clear that the interconnect lines are limited to signal lines. Accordingly, the Applicants respectfully submit that utilizing the interconnect line "3" for a combination of power and signal lines, as proposed by the Examiner in rejecting claim 17, is inappropriate. Additionally, this makes it even more unlikely that a person of ordinary skill in the art would find the discussion in Usami relevant in any way to power lines or power driver noise.

Accordingly, the modification of Usami is believed to be inappropriate and claim 17 is believed to be allowable. **Claim 30** depends from claim 17 and is believed to be allowable therefor as well as for the recitations independently set forth therein.

Claim 24 recites at least, "*forming a second plurality of power interconnect lines in the second intralayer dielectric*". Usami in view of Havemann and Doo does not teach or suggest these limitations for reasons similar to those discussed above for claim 17. Additionally, the Examiner

has proposed modifying Usami based on Havemann. As was stated in *In re Gordon*, 221 USPQ 1125, 1127 (Fed. Cir. 1984), “The mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification.” (emphasis added). Therefore, it is simply improper to add to Usami features for which there is no requirement. Additionally, even if Usami is modified as proposed by the Examiner, which is not even appropriate, the modification still does not teach or suggest all of the limitations of claim 24.

Accordingly, claim 24 is believed to be allowable. **Claims 25-26 and 35-36** depend from claim 24 and are believed to be allowable therefor as well as for the recitations independently set forth therein.

Claim 27 recites at least, “*forming a plurality of signal lines in the first dielectric layer and a power line in the second dielectric layer*”. Usami in view of Havemann and Doo does not teach or suggest these limitations for reasons similar to those discussed above for claim 17. Additionally, the Examiner has proposed modifying Usami based on Havemann. As was stated in *In re Gordon*, 221 USPQ 1125, 1127 (Fed. Cir. 1984), “The mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification.” (emphasis added). Therefore, it is simply improper to add to Usami features for which there is no requirement. Additionally, even if Usami is modified as proposed by the Examiner, which is not even appropriate, the modification still does not teach or suggest all of the limitations of claim 24.

Accordingly, claim 27 is believed to be allowable. **Claims 28-29 and 37** depend from claim 27 and are believed to be allowable therefor as well as for the recitations independently set forth therein.

35 U.S.C. §103 Rejection – Havemann in view of Doo

The Examiner has rejected claims 20-23, 31-34 and 38-44 under 35 U.S.C. §103(a) as being unpatentable over “Havemann” in view of “Doo”.

Claim 20 recites at least, *“forming a first pair of power interconnect lines to distribute power and a second pair of signal interconnect lines to carry signals from the conductive material”* and *“patterning the mask layer such that one portion of the dielectric material between one pair is covered and another portion of the dielectric material between another pair is uncovered”*. Havemann in view of Doo does not teach or suggest these limitations for reasons similar to those discussed above for claim 17.

Accordingly, claim 20 is believed to be allowable. **Claims 21-22 and 31-33** depend from claim 20 and are believed to be allowable therefor as well as for the recitations independently set forth therein.

Claim 23 recites at least, *“forming a first plurality of conductive power lines ... having a first dielectric therebetween”*, *“forming a second plurality of conductive signal lines ... having a second dielectric therebetween”*, and *“wherein the first dielectric has a dielectric constant greater than a dielectric constant of the second dielectric”*. Havemann in view of Doo does not teach or suggest these limitations for reasons similar to those discussed above for claim 17.

Accordingly, claim 23 is believed to be allowable. **Claim 34** depends from claim 23 and is believed to be allowable therefor as well as for the recitations independently set forth therein.

Claim 38 recites at least, *“making on the integrated circuit substrate an interconnect structure comprising a first pair of interconnect lines to distribute power having a first material disposed therebetween and a second pair of interconnect lines to carry signals having a second material disposed therebetween, wherein the first dielectric material has a first dielectric constant that is greater than a second dielectric constant of the second material”*. Havemann in view of Doo

does not teach or suggest these limitations for reasons similar to those discussed above for claim 17.

Accordingly, claim 38 is believed to be allowable. **Claims 39-44** depend from claim 38 and are believed to be allowable therefor as well as for the recitations independently set forth therein.

Request For References In Support Of What Is Allegedly Well Known

The Examiner has stated, *"it is well known in the art (as shown by Doo) that it is desirable to form a low-dielectric constant material between adjacent signal lines and that it is desirable to increase the capacitance of power lines (e.g., by incorporating a "higher" dielectric constant material between adjacent power lines)"*. There have been other statements of a similar nature. The Applicants respectfully submit that this is not well known. If the Examiner persists in this rejection, it is respectfully requested that a reference be provided in support of each element of such statements that the Examiner relies upon as being well known.

Conclusion

The Applicants respectfully submit that the rejections have been overcome by the amendments and remark, and that the claims as amended are now in condition for allowance. Accordingly, the Applicants respectfully request the rejections be withdrawn and the claims as amended be allowed. The Examiner is requested to call Brent E. Vecchia at (303) 740-1980 if there remains any issue with allowance of the case.

Request for an Extension of Time

The Applicants respectfully petition for an extension of time to respond to the outstanding Office Action pursuant to 37 C.F.R. § 1.136(a) should one be necessary. Please charge our Deposit Account No. 02-2666 to cover the necessary fee under 37 C.F.R. § 1.17(a) for such an extension.

Charge our Deposit Account

Please charge any shortage to our Deposit Account No. 02-2666.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

Date: July 8, 2002

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In The Claims:

Claims 17, and 20-44 remain unchanged.